

UNCLASSIFIED

AD 414235

DEFENSE DOCUMENTATION CENTER

FOR

SCIENTIFIC AND TECHNICAL INFORMATION

CAMERON STATION, ALEXANDRIA, VIRGINIA



UNCLASSIFIED

NOTICE: When government or other drawings, specifications or other data are used for any purpose other than in connection with a definitely related government procurement operation, the U. S. Government thereby incurs no responsibility, nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

CATALOGED BY DDC
AS AD No. **414235**

RF Project 691
Report No. 28

QUARTERLY

R E P O R T

by

THE OHIO STATE UNIVERSITY
RESEARCH FOUNDATION

1314 Kinnear Road
Columbus 12, Ohio

414235

To: DEPARTMENT OF THE NAVY
Office of Naval Research
Contract No. Nonr 495(12)
ARPA Order No. 23-61; Task 1, Item 4

On: STRUCTURAL AND THERMODYNAMIC PROPERTIES OF
POLYATOMIC MOLECULES AT ELEVATED TEMPERATURES

For the period: 1 April 1963 - 30 June 1963

Submitted by: David White
Department of Chemistry

Date: 6 August 1963

NO. OFS

STRUCTURAL AND THERMODYNAMIC PROPERTIES OF
POLYATOMIC MOLECULES AT ELEVATED TEMPERATURES

The analysis of the thermodynamic and spectral data of the molecular species LiO , Li_2O and Li_2O_2 has been completed. The results were presented at the Symposium of Molecular Structure and Spectroscopy in Columbus, Ohio. A complete report of the work entitled "The Infrared Spectra, Structures and Thermodynamics of Gaseous LiO , Li_2O , and Li_2O_2 ," has been submitted for publication.

The analysis of the infrared spectrum of Al_2O^{16} , Al_2O^{18} has been completed during the period and a report is now under preparation. As previously indicated this molecule appears to have an open structure in C_{2v} symmetry. The isotopic shifts are consistent with a bond angle in the range 140 to 160 degrees.

Some preliminary mass spectrometric and matrix isolation studies have been completed on the vapors in equilibrium with solid sodium peroxide at elevated temperatures. We have positively identified the molecular species Na_2O , NaO in the vapor phase and possibly the peroxide form of Na_2O_2 . The infrared spectra of the vapors trapped in solid Krypton matrices show bands which from the magnitude of the frequencies appear to be due to sodium oxygen stretches in the molecular species Na_2O and NaO .

During this report period we have completed the fabrication assembly and testing of the equipment to determine the true band widths of simple diatomic molecules trapped in solid rare gas matrices at low temperatures. A specially designed dewar utilizing a Air Products Miniature Joule-Thomson Liquifier will be employed in these experiments. This will be coupled to the high resolution grating spectrometer (0.04 to 0.05 cm^{-1}) of Professor Rao in the Department of Physics.

Measurements of the infrared spectrum of matrix isolated B_2Cl_4 using the prism instruments have been completed. An analysis of the results indicated the necessity of examination of some of the bands under conditions of higher resolution. These experiments are just getting under way.

Investigator _____ Date _____

Supervisor David White Date 8/7/63

For The Ohio State University Research Foundation

Acting
Executive Director Thomas E. Davis Date 8/8/63